Recreational Mail Surveys, 1985 — Tidal Sportfishing Diary Program and Visitors Sportfishing Survey

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by

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RECREATIONAL MAIL SURVEYS, 1985 - TIDAL SPORTFISHING DIARY PROGRAM AND VISITORS SPORTFISHING SURVEY

PREFACE

The Tidal Sportfishing Diary Program was initiated in 1979 to obtain estimates of the sport catch by B.C. residents fishing in B.C. tidal waters. The Visitors Sportfishing Survey was first conducted in 1982 to obtain estimates of sport catch and expenditures by visitors fishing in B.C. tidal waters. Previous reports cover survey development and annual results. This report serves as a continuation of this series and deals with the 1985/86 results.

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RECREATIONAL MAIL SURVEYS, 1985 - TIDAL SPORTFISHING DIARY PROGRAM AND VISITORS SPORTFISHING SURVEY

ABSTRACT

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Mail surveys collected 1985/86 licence year catch and effort data on recreational fishing in B.C. tidal waters. During 2,260,000 angler days, adult anglers caught and kept 1,963,000 salmon including 550,000 chinook and 1,117,000 coho. Most effort was from boats and directed towards salmon in general. Juvenile anglers caught and kept an additional 79,000 chinook and 167,000 coho during 351,000 angler days. Developments in the Diary program and problems related to mail surveys are reviewed.

Keywords: sportfishing, tidal waters, logbook, mail survey, catch statistics

RÉSUMÉ

Bijsterveld, L. and M. James. 1987. Recreational mail surveys, 1985 - Tidal Sportfishing Diary Program and Visitors Sportfishing Survey. Can. MS. Rep. Fish. Aquat. Sci. 1914: iv + 51 p.

Lors d'enquêtes par correspondance, on a recueilli des données sur les efforts et les prises pour la saison de pêche récréative 1984-1985 dans les eaux de marée en C.-B. Pendant 1 990 000 jours-pêcheurs, les pêcheurs à la ligne adultes ont capturé et gardé 1 108 000 saumons dont 490 000 saumons chinook et 565 000 saumons coho. La plupart des efforts ont été faits à partir de bateaux et visaient le saumon en général. Les jeunes pêcheurs à la ligne ont en plus capturé et gardé 78 000 saumons chinook et 98 000 saumons coho en 330 000 jours-pêcheurs. Les développements du programme et les problèmes reliés aux enquêtes par correspondance sont à l'étude.

Mots clés: pêche sportive, eaux de marée, journal de bord, enquête par correspondance, statistiques sur les prises.

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RECREATIONAL MAIL SURVEYS, 1985 - TIDAL SPORTFISHING DIARY PROGRAM AND VISITORS SPORTFISHING SURVEY

INTRODUCTION

The Tidal Sportfishing Diary Program is a mail survey of resident B.C. tidal water anglers. The Diary Program was introduced in 1979 as a method of estimating recreational catch and effort. It was necessary to survey large numbers of B.C. adults in order to contact anglers in the absence of a licencing program. The B.C. Tidal Waters Sport Fishing Licence, introduced during 1981, identified anglers and provided a sample base for the program beginning in 1982. The licences also provide a sample base for anglers visiting B.C. The Visitors Sportfishing Survey was first conducted in 1982 to obtain estimates of sport catch and expenditures by anglers visiting B.C. during the previous year. The 1981 and 1982 licence years corresponded to calendar years (January 1 to December 31). The 1983 licence year was a transition from a calendar year to a fiscal year (April 1 to March 31) and extended from January 1, 1983 to March 31, 1984. The Tidal Waters Licence year was changed to correspond to the B.C. Angling Licence year resulting in a 15 month licence for 1983/84. The 1983 Diary program and Visitors Survey covered the entire 15 month period although only the 1983 calendar year statistics were published. The 1985/86 population and catch and effort statistics correspond to the 1985/86 licence year (April 1, 1985 - March 31, 1986).

METHODOLOGY

A systematic sample of 17,000 1984/85 B.C. Tidal Waters Sport Fishing Licences was drawn. The licence information was keypunched directly from the licence stubs to produce an address list. The B.C. addresses were used for the Tidal Diary program while the remainder were used for the Visitors Sportfishing Survey.

Tidal Sportfishing Diary Program

In previous years, questionnaires were sent to sampled anglers from B.C. early in the survey year. Questionnaire recipients were asked about their fishing activity in the previous year and whether they were willing to keep a diary of daily fishing records during the coming licence year. A sample of nonrespondents was surveyed by telephone to obtain the questionnaire information. The questionnaire and telephone survey data were used to adjust the potentially greater catch and effort of diary volunteers. Questionnaire respondents volunteering to keep records were supplied with diary booklets covering a total of one year (15 months in 1983/84). Diarists were asked to record the catch and effort information for an entire fishing party, for various species.

This long reporting period for one sample group could have resulted in bias due to changed fishing behaviour over time, underreporting of activity due to tiredness and a higher rate of nonresponse (Pagliccia 1984). A rotating sample was suggested to spread the reporting burden among more individuals. This method also allows improvements to be introduced and permits inseason estimates.

In 1985/86, the Diary Program was conducted as follows: semi-monthly, a new sample or panel of 350 license holders was mailed a diary form covering a full "month". Half of the panels were responsible for recording fishing activity for a calendar "month", the other half for an interval from the

middle of one month to the middle of the next. Data for the first half of the "month" was filled in from memory; data for the second half was filled in as they fished. Reminders were sent to all panel members at the end of the "month". Diarists were provided with return addressed postage paid envelopes for returning the survey forms. Drawings of the 5 salmon species were included to aid identification.

Visitors Sportfishing Survey

Approximately 2,500 questionnaires were sent to visiting North American anglers (excluding B.C.). Reminders were sent to questionnaire non-respondents four weeks after the initial sendout. Questionnaire recipients were asked about their fishing activity and expenditures in B.C. during the 1985/86 licence year.

RESULTS

Returns

The number of diary returns for each panel of 1985/86 Diary Program is provided in Table 1. The proportion of respondents fishing during each diary period varies throughout the year, as shown in Table 1.

Approximately 2,500 questionnaires were sent out for the 1985/86 Visitors Survey. The return rate for the Visitors Survey was 66%.

Resident Sportfishing Population

The estimated number of B.C. resident adult anglers in 1985/86 is provided in Table 2. The population is estimated from sportfishing licences and consists of adult B.C. resident tidal water anglers (aged 16 and over).

Characteristics of the population of licence holders can be estimated from the sample of licence holders selected to receive questionnaires. Males account for 80% of the population of licence holders while females account for only 20% (Figure 1). The population of B.C. adults, by comparison, is composed of almost equal numbers of males and females (Statistics Canada 1986b).

The age composition of the B.C. adult population is presented in Figure 2. The proportion of individuals between 26 and 64 years of age is higher among licenced anglers than among B.C. adults in general. More young adults and seniors are present in the total population of adults (Statistics Canada 1986b).

TABLE 1

DIARY RETURNS - 1985/86

Panel Period	Undeliverable	Total Possible Response	Number Respondents	Adjusted Response (%)	% That Fished
Mar. 16/85-Apr. 15/85	20	330	195	59%	5%
Apr. 01/85-Apr. 30/85	26	324	192	59%	10%
Apr. 16/85-May 15/85	28	322	205	64%	15%
May 01/85-May 31/85	42	308	196	64%	25%
May 16/85-Jun. 15/85	41	309	182	59%	29%
Jun. 01/85-Jun. 30/85	38	312	178	57%	28%
Jun. 16/85-Jul. 15/85	41	309	157	51%	29%
Jul. 01/85-Jul. 31/85	41	309	178	58%	35%
Jul. 15/85-Aug. 15/85	37	313	175	56%	31%
Aug. 01/85-Aug. 31/85	56	294	158	54%	34%
Aug. 16/85-Sep. 15/85	57	293	151	52%	34%
Sep. 01/85-Sep. 30/85	56	294	173	59%	26%
Sep. 15/85-Oct. 15/85	59	291	160	55%	14%
Oct. 01/85-Oct. 31/85	55	295	176	60%	9%
Oct. 15/85-Nov. 15/85	43	307	165	54%	4%
Nov. 01/85-Nov. 31/85	43	307	185	60%	5%
Nov. 15/85-Dec. 15/85	50	300	171	57%	4%
Dec. 01/85-Dec. 31/85	45	305	178	58%	7%
Dec. 15/85-Jan. 15/86	52	298	198	66%	8%
Jan. 01/86-Jan. 31/86	53	297	173	58%	4%
Jan. 16/86-Feb. 15/86	55	295	174	59%	5%
Feb. 01/86-Feb. 28/86	61	289	169	58%	5%
Feb. 16/86-Mar. 15/86	50	300	173	58%	5%
Mar. 01/86-Mar. 31/86	52	298	169	57%	8%
Mar. 16/86-Apr. 15/86	48	302	130	43%	7%

TABLE 2

POPULATION OF B.C. RESIDENT TIDAL WATER ANGLERS
ESTIMATED FROM LICENCE SALES

Year	Number of Anglers
1981	203,000
1982	223,000
1983/84	224,000
1984/85	225,000
1985/86	239,000

The distribution of B.C. residents and licenced anglers by area of residence is presented in Figure 3. Eighty percent of licenced anglers are from Vancouver Island and the Greater Vancouver area. These areas account for only 60% of the total population of B.C. (Statistics Canada 1986a). The proportion of licenced anglers is higher than the proportion of the population in coastal areas, with the exception of Greater Vancouver.

Population of Visiting Anglers

An estimated 93,400 visiting anglers fished in B.C. tidal waters in 1985/86. The population consisted of 27,200 Canadians, 63,600 U.S. visitors and 2,600 visitors from other countries (Table 3). The sex composition of the population of visiting anglers is similar to the composition of B.C. resident anglers. Males account for 80% of the visiting population and females account for 20%.

The age composition of the population of visiting anglers is presented in Figure 2. The proportion of individuals over the age of age 45 is higher among visiting anglers than among B.C. resident anglers.

The proportion of visiting anglers from various areas in Canada and the U.S. is presented in Table 3. Half of the visiting anglers originated from areas adjacent to B.C. (Alberta and Washington). Americans accounted for 68% of the visiting anglers while Canadians accounted for 29%. The remaining .3% of the visiting anglers originated from outside North America.

TABLE 3

POPULATION OF VISITING ANGLERS
ESTIMATED FROM LICENCE SALES

	Country of Origin			
Year	Canada	U.S.A.	Other	Total
1981	32,300	43,100	3,600	79,000
1982	28,700	40,900	1,500	71,100
1983/84	30,300	42,600	2,000	74,900
1984/85	25,700	51,600	300	77,600
1985/86	27,200	63,600	2,600	93,400

FIGURE 1

SEX COMPOSITION OF B.C. ADULTS, ANGLERS AND VISITING ANGLERS - 1985/86

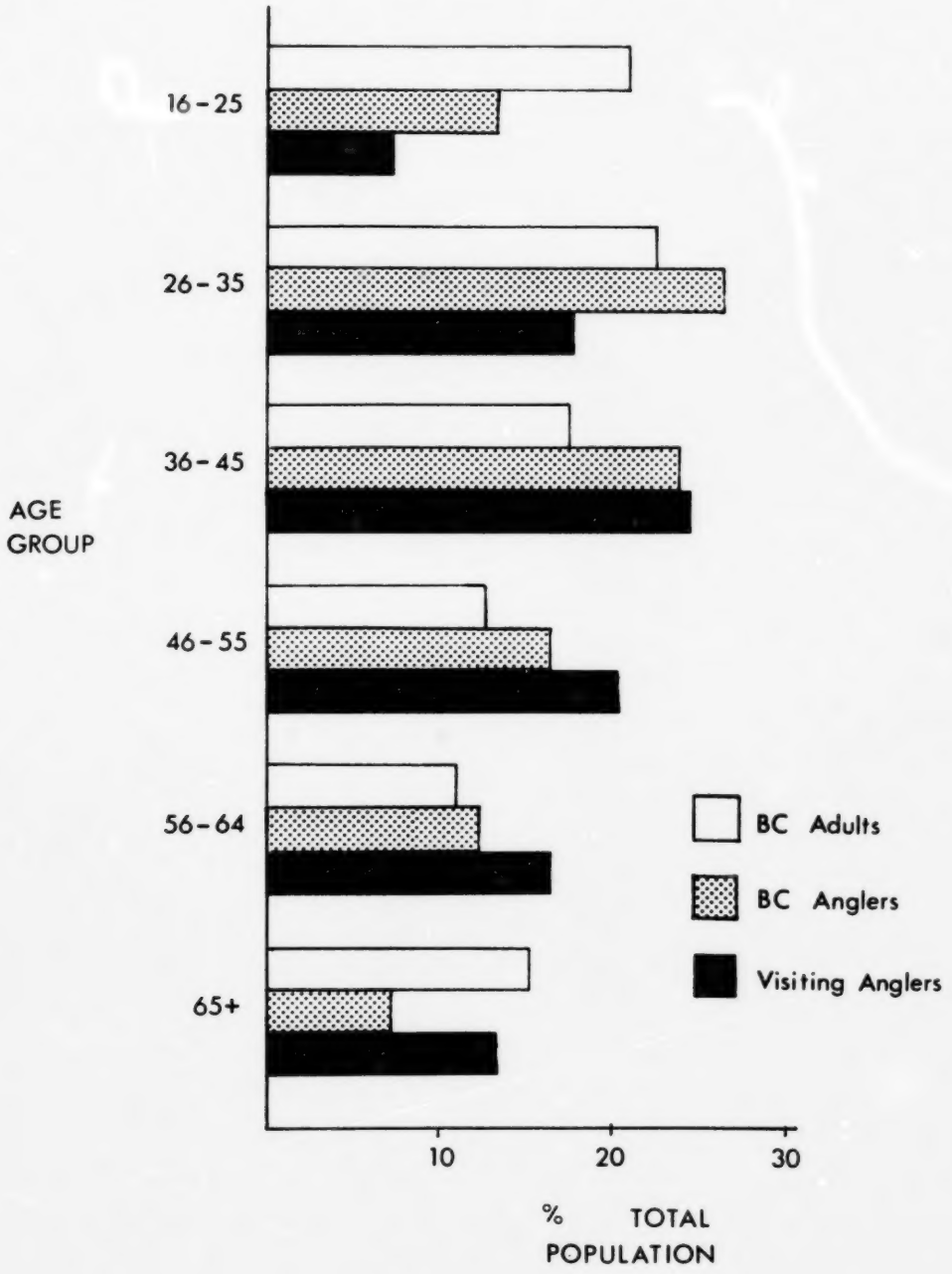

FIGURE 2

AGE COMPOSITION OF B.C. ADULTS, ANGLERS AND VISITING ANGLERS - 1985/86

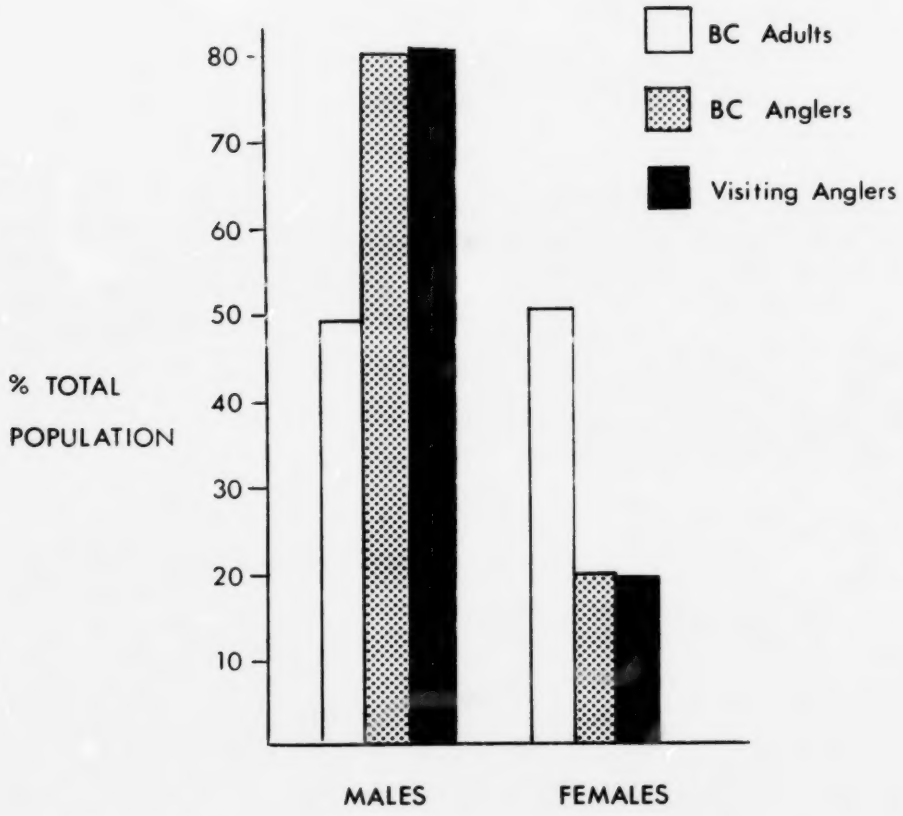

FIGURE 3

DISTRIBUTION OF B.C. RESIDENTS AND LICENCED ANGLERS
BY RESIDENCE AREA - 1985/86

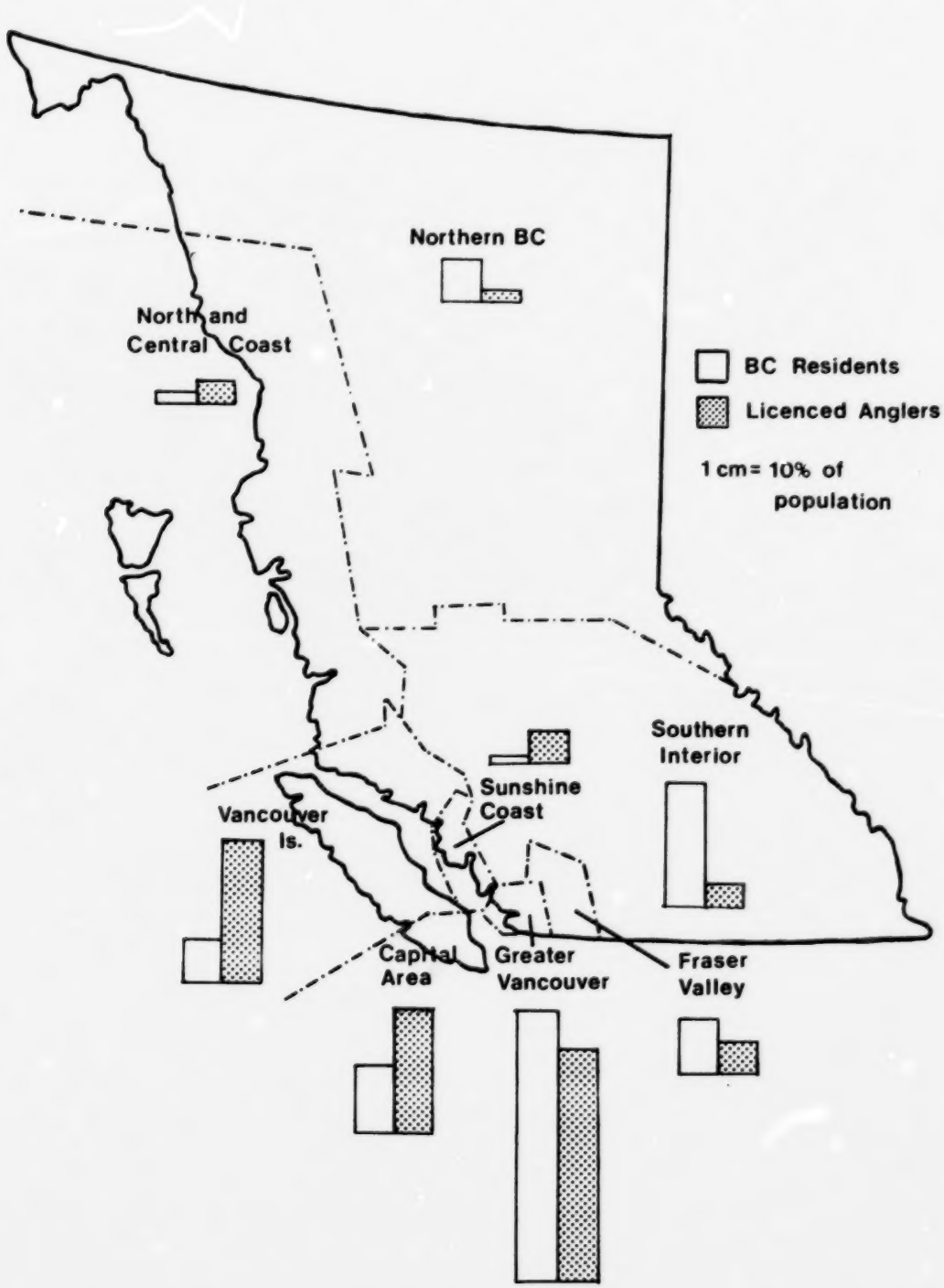

TABLE 4

RESIDENCE OF VISITING ANGLERS - 1985/86

CANADA

Province	Percentage of Total Visiting Anglers
Alberta	19
Ontario	5
Saskatchewan	2
Other	3
Total Canada	29

UNITED STATES

State	Percentage of Total Visiting Anglers
Washington	33
California	14
Oregon	6
Other	15
Total United States	68

Catch

British Columbia resident adult anglers caught and retained 1,650,000 salmon during the 1985/86 licence year (Table 5). The catch consisted of 464,000 chinook, 930,000 coho, and 256,000 salmon of other species.

Visiting anglers caught an additional 314,000 salmon, consisting of 86,000 chinook, 188,000 coho and 40,000 salmon of other species (Table 6). The combined catch by B.C. resident and visiting anglers was 550,000 chinook, 1,117,000 coho and 296,000 salmon of other species, resulting in a total catch of 1,963,000 salmon in 1985/86 (Table 7).

Most of the salmon were caught inside Vancouver Island. This area accounted for 85% of the chinook, 95% of the coho and 90% of the total salmon caught and kept by B.C. resident anglers in 1985/86. This area contributed a smaller proportion (81%) of the total salmon catch by visiting anglers.

Over half of the salmon were taken during the summer months (June, July and August) in 1985/86 (Table 8). The total salmon and coho catches peaked in August while the chinook catch peaked a month earlier.

TABLE 5

1985/86 TIDAL SPORTFISHING DIARY PROGRAM
B.C. ADULT RESIDENT CATCH[1] AND EFFORT BY REGION ('000's)

Region	Angler Days	Chinook	Coho	Other Salmon	Total Salmon
North Coast (Areas 1-6)[2]	41.6	13.6	8.0	11.5	33.1
Central Coast (Areas 7-11)[2]	31.4	6.8	20.3	21.9	49.0
E. Vancouver Is. (Areas 12-14)[2]	407.0	117.0	426.6	19.6	563.2
Sunshine Coast (Areas 15-16)[2]	203.4	47.7	160.5	1.9	210.1
S. Vancouver Is. (Areas 17-20)[2]	618.7	192.3	220.6	185.4	598.3
W. Vancouver Is. (Areas 21-27)[2]	150.5	48.4	22.4	12.5	83.3
Lower Mainland (Areas 28-29)[2]	205.7	37.7	71.3	3.5	112.5
Total B.C. (Areas 1-29)[2]	1,658.3	463.5	929.7	256.3	1,649.5

[1] Catch is reported as number of fish kept.
[2] Department of Fisheries statistical areas.

TABLE 6

1985/86 VISITORS SPORTFISHING SURVEY
CATCH[1] AND EFFORT BY VISITING ANGLERS BY REGION ('000's)

Region	Angler Days	Chinook	Coho	Other Salmon	Total Salmon
North Coast (Areas 1-6)[2]	28.9	6.7	4.8	2.5	14.0
Central Coast (Areas 7-11)[2]	25.0	3.5	6.4	3.4	13.3
E. Vancouver Is. (Areas 12-14)[2]	329.4	45.4	134.2	20.8	200.4
Sunshine Coast (Areas 15-16)[2]	38.2	4.9	10.1	.9	15.9
S. Vancouver Is. (Areas 17-20)[2]	100.4	11.5	17.0	6.2	34.7
W. Vancouver Is. (Areas 21-27)[2]	69.7	12.9	12.6	5.5	31.0
Lower Mainland (Areas 28-29)[2]	10.5	1.1	2.4	.7	4.2
Total B.C. (Areas 1-29)[2]	602.1	86.0	187.5	40.0	313.5

[1] Catch is reported as number of fish kept.
[2] Department of Fisheries statistical areas.

TABLE 7

1985/86 B.C. TIDAL WATER SPORT CATCH AND EFFORT ('000s)

	B.C. Resident Anglers[1]	Visiting Anglers[2]	Total
Angler Days	1,658.3	602.1	2,260.4
Chinook	463.5	86.0	549.5
Coho	929.7	187.5	1,117.2
Other Salmon	256.3	40.0	296.3
Total Salmon	1,649.5	313.5	1,963.0

1. Tidal Sportfishing Diary Program.
2. Visitors Sportfishing Survey.

TABLE 8

1985/86 B.C. TIDAL WATER SPORT SALMON CATCH[1] ('000's) BY MONTH

Month	Chinook	Coho	Other Salmon	Total Salmon
1985-April	34.6	43.7	.8	79.1
May	91.7	155.1	4.2	251.0
June	97.7	222.6	10.3	330.6
July	96.8	276.2	37.3	410.3
August	117.9	261.7	135.5	515.1
September	46.4	90.8	96.5	233.7
October	6.6	50.6	1.6	58.8
November	10.0	2.8	4.5	17.3
December	18.3	1.3	0	19.6
1986-January	7.9	0	0	7.9
February	10.1	1.3	.1	11.5
March	12.8	12.3	5.6	30.7
Total	550.8	1,118.4	296.4	1,965.6

1. Catch is reported as numbers of fish kept.

Effort

British Columbia resident anglers fished an estimated 1.7 million days in 1985/86. Visiting anglers fished an estimated 602,000 days in B.C. tidal waters in the 1985/86 licence year, bringing the total tidal water estimate of effort to 2.3 million days during the 1985/86 licence year.

More than 90% of the finfish effort by B.C. resident anglers occurred from boats. The percentage of effort from boats was much lower around the Fraser River (area 29) due to a closure to salmon sport fishing at the mouth of the Fraser River (Department of Fisheries and Oceans 1985). Fishing from the shore and fishing bars accounted for more than one quarter (27%) of the effort in this area in 1985/86.

Over half of the total effort occurs during the summer months (July through September). Most of the angler effort (85%) occurs inside Vancouver Island.

Catch Per Unit Effort (CPUE)

The average catch per angler day for B.C. resident anglers during 1985/86 was 0.28 chinook, 0.56 coho and 0.99 for all salmon combined (Table 9). The average catch per angler day for visiting anglers was 0.14 chinook, 0.31 coho and 0.52 for all salmon combined. The average CPUE of sublegal salmon by B.C. resident anglers in 1985/86 was 0.34 chinook and 0.35 coho. The sublegal catch rates were highest from September through November and exceeded the catch rates of legal chinook and coho during most of this time.

Catch and Effort by Juvenile Anglers

The population of anglers aged 15 and under cannot be estimated directly from licence sales because these anglers are not required to purchase

TABLE 9

SALMON CATCH PER UNIT EFFORT

	Chinook	Coho	Total Salmon
1985/86			
B.C. Resident Anglers	0.28	0.56	0.99
Visiting Anglers	0.14	0.31	0.52
All Anglers	0.24	0.49	0.87

B.C. Tidal Waters Sport Fishing Licences. Based on questionnaire data the 1982 through 1984 Diary programs, the ratio of B.C. juvenile to adult anglers is 1:4. The estimated number of B.C. juvenile anglers in 1985/86 is 60,000. The number of visiting juvenile anglers is 29,000, estimated from the Visitor survey.

Other surveys (Cox 1977; Cumming 1979; Pelletier, Lacasse and Ducharme 1981; Thomson 1974) indicate that the average number of days fished by resident juvenile anglers is one-third to two-thirds the average number of days fished by their adult counterparts. Juvenile resident anglers fished an estimated 211,000 days in 1985/86 assuming that each juvenile resident angler fishes half as many days as an adult resident. Visiting juvenile anglers fished an estimated 140,000 days in 1985/86. This estimate is based on the assumption that visiting juveniles fish 75% the number of days fished by visiting adults.

Using the catch rates for adult anglers, resident juvenile anglers caught an estimated 59,000 chinook and 124,000 coho, while visiting juvenile anglers caught an estimated 20,000 chinook and 43,000 coho. These catches are not included in the previously discussed catches by adult anglers.

DISCUSSION

Survey Biases

Certain types of error are associated with any type of survey. One type of error is referred to as nonresponse and results from the failure to measure or contact the entire survey sample (Cochrane 1977). Biased measurements could be obtained if the characteristics of the measured group differ from the group that was not measured. Individuals that voluntarily return questionnaires as part of a mail survey are possibly more interested in the questionnaire subject and could differ from those who don't return questionnaires. Tidal Diary respondents could be more active and successful anglers than nonrespondents. Estimates of fishing activity from this source alone would be biased upwards. Nonrespondents were not surveyed during the 1985/86 program.

Nonrespondents are being surveyed as part of the 1986/87 Diary program. Preliminary survey results indicate that 73% of the nonrespondents fished compared to 74% of the respondents. A chi-square test indicated no difference between these participation rates at the .05 level of significance. Nonrespondents reported fishing more days and catching more salmon, on the average, although these differences are not significant as indicated by t-tests at the .05 level of significance. Catch per angler day (CPUE) can be considered to be a measure of fishing success. The chinook and coho CPUE for respondents were higher but not significantly so as indicated by t-tests at the .05 level of significance. Therefore the nonrespondents were as successful as the respondents.

Another source of error is recall bias and arises because individuals cannot always accurately recall details after time has passed. The result could be either under or over estimating, depending on the subject. This type of bias can be a problem in postseason mail surveys such as the Visitors

Survey when the recall period is long. Diary program participants, however, are asked to recall the last half month only and keep records as they fish for the remainder of the month. For each half month, there is a recalled set of data and a current set of data. The recalled data are given less 'weight' than the current data in the estimation (Appendix C).

Error can also result from inaccurate reporting by the respondents. Salmon drawings with identification points were supplied to all of the diarists to assist in correct species identification.

The number of days fished and salmon caught could also be subject to error due to inaccurate reporting. During the first two program years (1979 and 1980) the estimates of catch per unit effort (CPUE) obtained from the diary program were higher than estimates obtained from other sources (MacGregor 1982). Two possible explanations were the overreporting of the catch or the underreporting of the number of days fished. MacGregor concluded that anglers were not reporting fishing days when no salmon were caught, which resulted in an underestimate of the angler days. The CPUE estimates for various surveys conducted during 1985 are presented in Table 10. The CPUE estimates obtained from the Diary Program are approximately double the estimates from other surveys. Since the 1985/86 diary form emphasized salmon catches (Appendix D), it is possible that anglers did not report days when no salmon were caught. The 1986/87 Diary is placing more emphasis on reporting zero catch and nonsalmon days in the diary design and accompanying instructions.

TABLE 10

1985-CATCH PER ANGLER DAY ESTIMATES

Time Period	Areas[1]	CPUE Chinook	CPUE Coho	Catch Reported	Survey
1985/86	Total BC (1-29)	.28	.56	individual, BC residents	TSDP
1985/86	Total BC (1-29)	.14	.31	party, visitors	VSS
1985	Total BC (1-29)	.17	.37	individual, BC residents	NSS
1985	Total BC (1-29)	.28	.74	individual, visitors	NSS
1985	Georgia St. (13-19,28,29)	.19	.42	individual, all anglers	NSS
1985	Georgia St. (13-19,28,29)	.15	.46	boat, all anglers	GSCS
1985/86	Georgia St. (13-19,28,29)	.28	.61	individual, BC residents	TSDP
1985/86	Georgia St. (13-19,28,29)	.14	.37	party, visitors	VSS

TSDP = Tidal Sportfishing Diary Program
VSS = Visitor Sportfishing Survey
NSS = National Survey of Sportfishing
GSCS = Georgia Strait Creel Survey

[1] Department of Fisheries statistical areas

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APPENDIX A

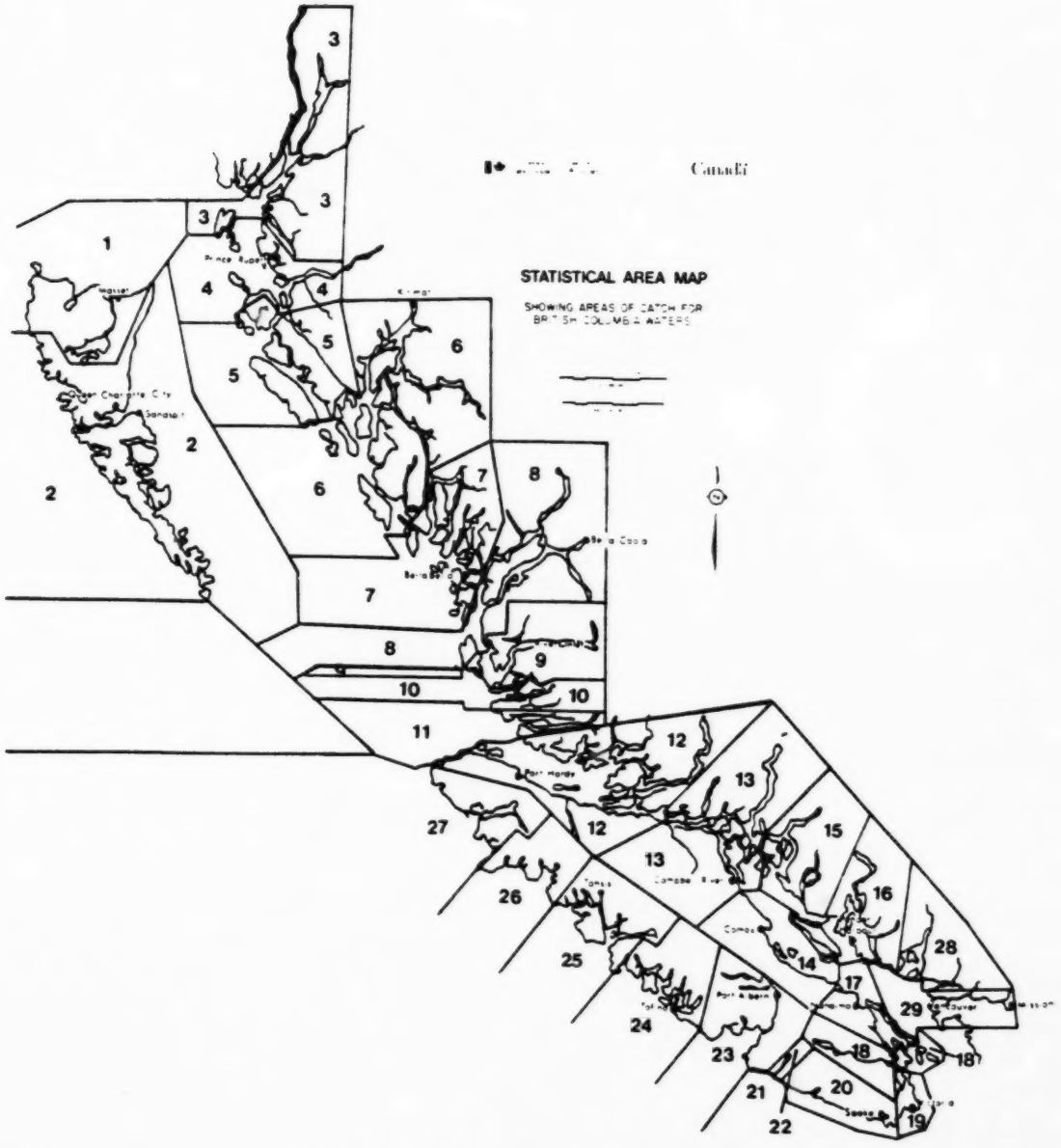
Species List

Common and Scientific Names of Fish Recorded by Tidal Water Anglers

Common Name	Scientific Name
Chinook	*Oncorhynchus tschawytscha*
Coho	*Oncorhynchus kisutch*
Pink	*Oncorhynchus gorbuscha*
Chum	*Oncorhynchus keta*
Sockeye	*Oncorhynchus nerka*
Lingcod	*Ophiodon elongatus*
Rockfish	*Sebastes* spp.
Halibut	*Hippoglossus stenolepis*
Pacific cod	*Gadus macrocephalus*

APPENDIX B

Statistical Area Map



APPENDIX C

Tidal Sportfishing Diary Program-Calculations

1. Estimating the Population of BC Resident Anglers

A sample of 1985/86 licences was drawn for the 1986/87 mail surveys. From this sample, it was determined that 91.3% of the resident annual licences were purchased by B.C. residents while 8.6% of the one day licences were purchased by B.C. residents. The number of B.C. resident anglers is estimated by multiplying these fractions by the total sales of resident annual and one day licences as follows:

$$ANGBC = (RSALES * .913) + (DSALES * .086)$$

where ANGBC = estimated number of B.C. resident anglers
RSALES = total resident annual licence sales
DSALES = total one day licence sales.

The number of anglers from other provinces, states and countries was estimated using this method and substituting the proportion from the sample for each province or state for each licence type.

2. Estimating Catch and Effort

The formula for the preliminary estimate for one panel in period i was:

$$Y_i = (1-w)C_i + w * \frac{C_i}{R_{i-1}} * Y_{i-1}$$

where C_i= the total reported by the ith panel during the "current" half month.

R_{i-1}= total reported by the ith panel during the "remembered" half month.

Y_{i-1}= the preliminary estimate for period (i-1).

$w = \frac{1 - \sqrt{(1-r^2)}}{r}$, r = correlation between R_{-1} and C.

The final estimate for a panel in period i was:

$$T_i = k * Y_i + (1-k) * R_i$$

where Y_i= the previously defined preliminary estimate.

R_i= the total reported by the (i+1)st panel during the "remembered" half of the month.

$k = \frac{1 - \sqrt{(1-r^2)}}{r^2}$

The panels and periods are illustrated in Figure C1. The final estimate for a panel in a month composed of period (i-1) and i was T_{i-1} and T_i.

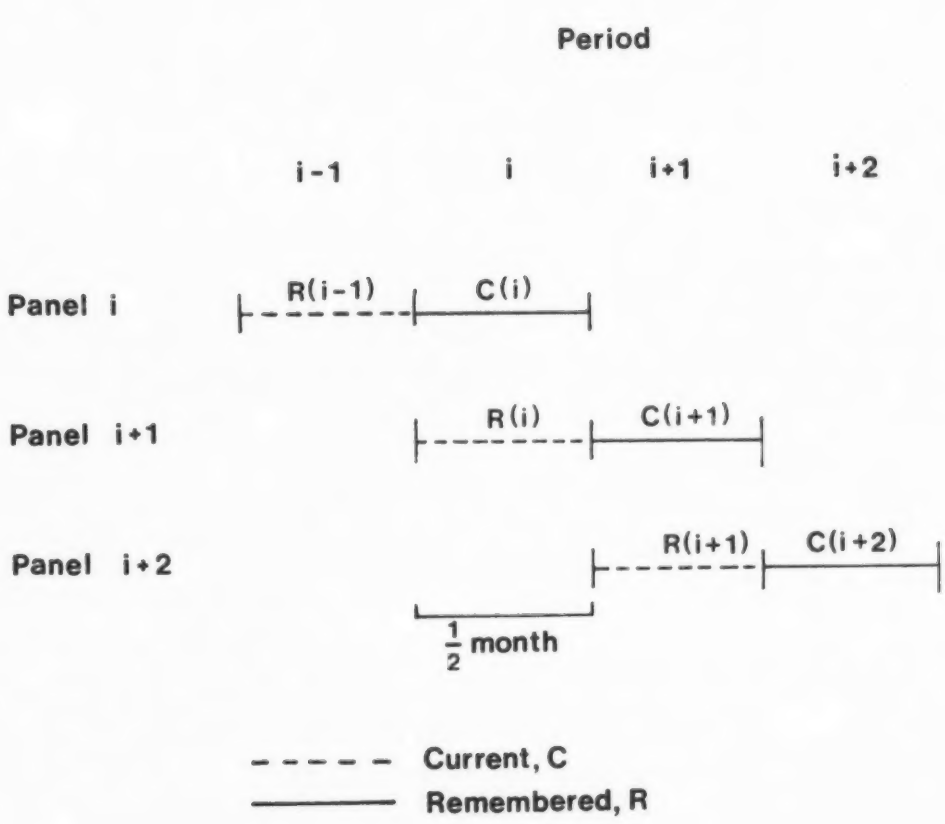
The formula for the panel size is:

$$\text{panel size} = \frac{kwP_{i-2} + kP_{i-1} + (1-kw)\ P_i\ (1-k)\ P_{i+1}}{2}$$

where P_{i-2} = the number of respondents from the (i-2)th panel
P_{i-1} = the number of respondents from the (i-1)th panel
P_i = the number of respondents from the ith panel
P_{i+1} = the number of respondents from the (i+i)th panel
k, w are previously defined.

FIGURE C1

1985 TIDAL SPORTFISHING DIARY PROGRAM
PERIOD AND PANEL PRESENTATION



Note that the calculation had the following disadvantages:

a. It was difficult to calculate the variance of the monthly estimates because a monthly estimate consists of two final estimates, $T_{i-1}+T_i$, added together. The estimates are not independent because all estimates were based on previous panel data. Therefore, the variance of a monthly estimate is not simply the sum of the variances of T_{i-1} and T_i. The covariance of these estimates has to be calculated and incorporated.

b. One of the conditions for this formula is that there are no correlations between the results from different panels (Woodruff, 1963). It has been shown that there is a positive correlation between the fishing activity in a month and the activity in previous months (James unpublished data). The seasonal nature of recreational fishing makes this type of estimation inappropriate.

A simpler formula was developed for the 1986/87 program. The new calculation produces independent estimates for each month and permits simple variance estimation.

APPENDIX D

SAMPLE FORMS

1. Tidal Sportfishing Diary - Page 1

Tidal Sportfishing Diary (K1)

Date	Area (See map)	Fishing From: Boat, Shore, Pier, Bar or Diving	Chinook				Coho				Other Salmon		
			under 45 cm released	45 cm & over rel.	kept	# marked	under 30 cm released	30 cm & over rel.	kept	# marked	Pink kept	Chum kept	Sockeye kept
Fri Aug 16													
Sat 17													
Sun 18													
Mon 19													
Tue 20													
Wed 21													
Thu 22													
Fri 23													
Sat 24													
Sun 25													
Mon 26													
Tue 27													
Wed 28													
Thu 29													
Fri 30													
Sat 31													
Sun Sept 1													
Mon 2													
Tue 3													
Wed 4													
Thu 5													
Fri 6													
Sat 7													
Sun 8													
Mon 9													
Tue 10													
Wed 11													
Thu 12													
Fri 13													
Sat 14													
Sun 15													

☐ Did not fish during this period.

1. Tidal Sportfishing Diary - Page 2

INSTRUCTIONS

Please record the following information in the appropriate column for each day fished in B.C. tidal waters during the dates covered by this diary form.

1. **Statistical area:** Refer to the map below and record the number that corresponds to your location.

2. **Fishing from:** Boat, shore, pier, river bar or diving only.

3. **Chinook:** The number of sublegal chinook released (under 18") and the number of legal size chinook released and kept by you personally.

4. **Coho:** The number of sublegal coho released (under 12") and the number of legal size coho released and kept by you personally.

5. **Other salmon:** The number of pink, chum and sockeye salmon kept by you personally.

Please record the fishing information even if you caught no salmon.

Please mail the form at the end of the diary period using the business reply envelope supplied. If you did not fish during the diary period, please check the box at the bottom of the form and return the diary by mail.

2. Visitor Sportfishing Survey - Page 1

Government of Canada / Gouvernement du Canada
Fisheries and Oceans / Pêches et Océans

Visitor Sportfishing Survey

Canada

1. How many visits to British Columbia did you make in this past licence year (April 1985-March 1986) which included fishing in B.C. Tidal waters?

_____ visit(s)

2. For each visit, please indicate:
   - the number of people in your party
   - the number of B.C. Tidal waters licence holders in your party
   - the number of people fishing in your party aged 15 or under
   - the total number of days spent in B.C. for each visit.

	People in party	Tidal waters Licence holders in party	Anglers aged 15 or under in party	Days spent in B.C.
Visit 1				
Visit 2				
Visit 3				
Visit 4				
Visit 5				

2. Visitor Sportfishing Survey - Page 2

3. What was your main reason for coming to British Columbia? (Please check one only)

☐ Visiting friends and relatives
☐ Fishing
☐ Business
☐ General vacation
☐ Other _____

4. Please indicate how your decision to come to B.C. was affected by the availability of Tidal Waters sportfishing (please check one only)

If there were no Tidal sportfishing available in B.C.:

☐ I would still have visited B.C. and substituted other activities.
☐ I would still have visited but would not have stayed as long (I would have stayed _____ days less).
☐ I would not have come at all.

5. If you could catch any species of fish available in B.C., which would you prefer?

☐ chinook (king, spring)
☐ coho
☐ any salmon
☐ halibut
☐ lingcod
☐ rockfish
☐ crab
☐ clams
☐ other _____

6. Did you use the services of a fishing guide while sportfishing in B.C. tidal waters this past year?

☐ Yes
☐ no

7. How did you originally find out about Tidal sportfishing in B.C.?

☐ travel agent
☐ friends or relatives
☐ magazine advertising
☐ local advertising while visiting B.C.
☐ other _____

2. Visitor Sportfishing Survey - Page 3

- 3 -

8. Please fill in the following table, even if you and your party caught no fish. Instructions for filling out the table are given below.

MONTH	AREA	DAYS	NO OF PEOPLE	CHINOOK	COHO	OTHER SALMON	OTHER FISH		SHELLFISH	
							number	type	number	type
August	13	4	3	6	3	1	2	lingcod		
August	14	3	3	0	0	0			3	crab

Month: Record the month(s) you personally fished in B.C. Tidal waters in the 1985/86 licence year (April 1985 through March 1986).

Area: Refer to the enclosed map of Fisheries statistical areas (opposite page), locate the area where you were fishing, and record the corresponding area number. If you fished in more than one area in the month, use a separate line for each area fished, and record the appropriate information for those areas on separate lines.

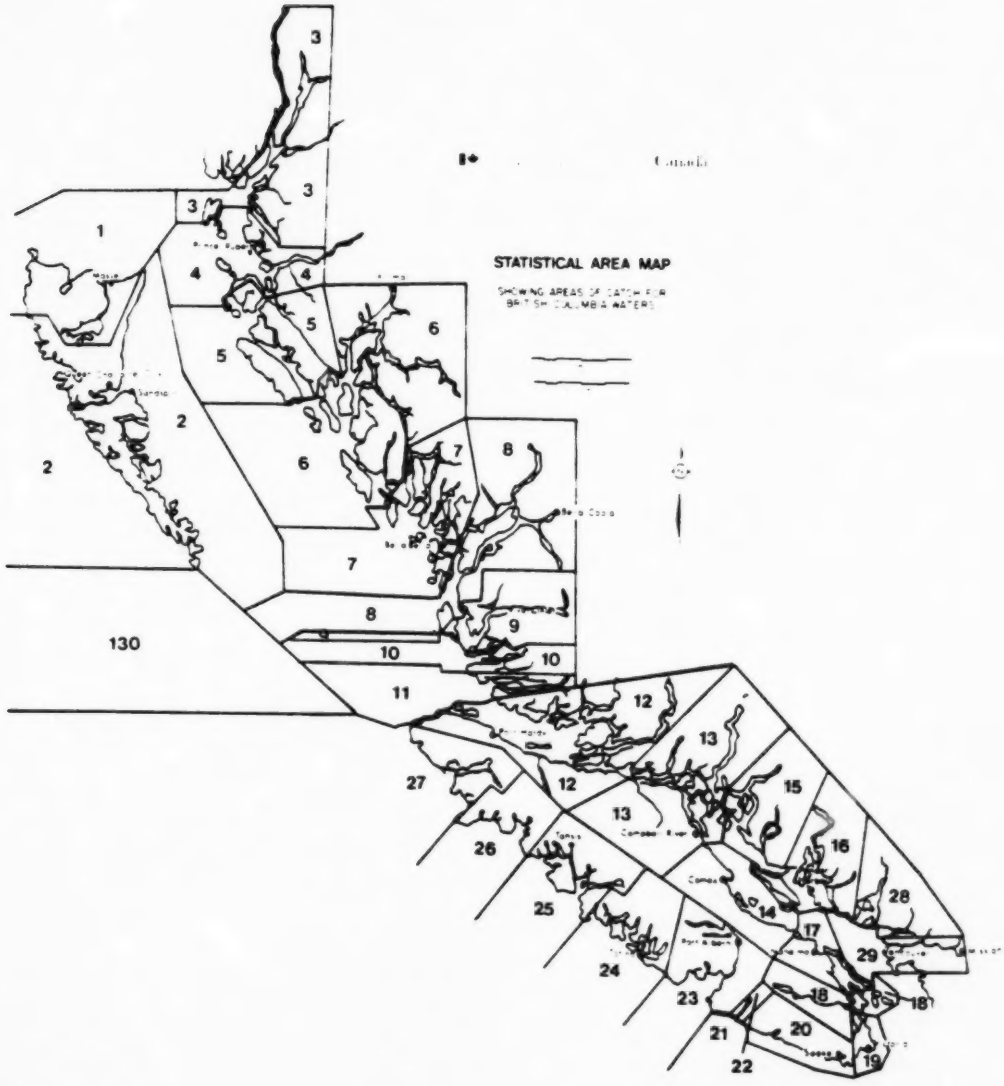
Days Fished: Record the days you personally fished in each area in each month, **including the days where nothing was caught.**

Number of People Fishing: Record the number of people, including yourself, who actually fished.

Catch: In the appropriate column, record the total number of fish caught by the fishing party (do not include fish that were released).

2. Visitor Sportfishing Survey - Page 4

- 4 -



2. Visitor Sportfishing Survey - Page 5

- 5 -

9. Did you purchase any "package" sportfishing trips, tours or outings to fish in B.C. Tidal waters in 1985/86 (for example, fly-in fishing camps or charter services where the price included transportation, lodging, food, tackle, bait, etc.)?

☐ yes ☐ no

If yes, what was the total price (Cdn $'s) of the package? $_____

10. Excluding package trips, please estimate below the amount of money (in Canadian dollars) your party spent <u>in B.C.</u> on trips that included sportfishing in the 1985/86 licence year (April 1985-Mar. 1986):

1.	Lodging (hotel, motel, cottage rental, etc.)	Cdn. $_____
2.	Trailer Park (campground fees)	$_____
3.	Food - restaurant meals & snacks	$_____
	- groceries	$_____
	- alcoholic beverages	$_____
4.	Travel Costs <u>within B.C.</u> - car	$_____
	- air	$_____
	- ferry	$_____
	- other	$_____
5.	Boat Rentals	$_____
6.	Fishing Supplies (tackle, rod, lures, etc.)	$_____
7.	Bait	$_____
8.	Household owned boat cost - gas	$_____
	- repairs	$_____
	- moorage	$_____
	- other	$_____
9.	Guide or Charter services (not included in question 9 on package trips)	$_____
10.	Fish processing (canning, smoking, etc.)	$_____
11.	Other (Specify) _____	$_____

2. Visitor Sportfishing Survey - Page 6

- 6 -

11. How many trips did you make to B.C. in the previous (1984/85) licence year that included Tidal water sport fishing?

_____ trip(s)

12. Did you purchase more than B.C. tidal waters sportfishing licence in 1985/86 (for example more than one 1-day licence)?

☐ Yes ☐ No If yes, how many? _____

13. Did you also purchase a B.C. provincial freshwater fishing licence during 1985?

☐ Yes ☐ No

14. Did you personally sportfish in your home province (state) this past year?

☐ Yes ☐ No

15. Please feel free to comment on your fishing experience in B.C. Tidal waters and indicate how it could have been improved.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____